

CLAIMS

5 *Sum 5* 1. A carbonaceous protective layer for protecting an underlying material, which is a layer formed by a Filtered Cathodic Arc process, and contains nitrogen distributed therein.

10 2. A carbonaceous protective layer according to claim 1, wherein a nitrogen content of said carbonaceous protective layer is 2 to 20 at%.

15 3. A carbonaceous protective layer according to claim 1, wherein nitrogen is distributed in an inclined concentration in said carbonaceous protective layer, and a nitrogen concentration is gradually increased from a bottom surface side to a top surface side in said carbonaceous protective layer.

20 4. A carbonaceous protective layer according to claim 1, wherein nitrogen is not contained in a substantially lower half portion, occupying substantially one half of the thickness-wise distance from a bottom surface of said carbonaceous protective layer.

25 5. A carbonaceous protective layer according to claim 1, wherein a hardness of said carbonaceous protective layer is at least 18 GPa.

6. A carbonaceous protective layer according to claim 1, wherein a contact angle of said carbonaceous protective layer to water is not greater than 35°.

25 7. A carbonaceous protective layer according to any one of claims 1 to 6, wherein said carbonaceous protective layer is positioned over a magnetic recording layer of the magnetic recording medium.

30 8. A magnetic recording medium comprising a non-magnetic substrate having applied thereon a magnetic recording layer, in which said magnetic recording layer has a carbonaceous protective layer formed thereon by a Filtered Cathodic Arc process, and said carbonaceous protective layer contains nitrogen distributed therein.

35 9. A magnetic recording medium according to claim 8, wherein a nitrogen content of said carbonaceous

protective layer is 2 to 20 at%.

10. A magnetic recording medium according to claim 8, wherein nitrogen is distributed in an inclined concentration in said carbonaceous protective layer, and a nitrogen concentration is gradually increased from a bottom surface side to a top surface side in said carbonaceous protective layer.

11. A magnetic recording medium according to claim 8, wherein nitrogen is substantially not contained in a lower half portion, occupying substantially one half of the thickness-wise distance from a bottom surface of said carbonaceous protective layer.

12. A magnetic recording medium according to claim 8, wherein a hardness of said carbonaceous protective layer is at least 18 GPa.

13. A magnetic recording medium according to claim 8, wherein a contact angle of said carbonaceous protective layer to water is not greater than 35°.

14. A method of producing a magnetic recording medium comprising a non-magnetic substrate having applied thereon a magnetic recording layer, which has a carbonaceous protective layer deposited thereon, which method comprises the step of depositing said carbonaceous protective layer on said magnetic recording layer by a Filtered Cathodic Arc process, while introducing nitrogen into said carbonaceous protective layer.

15. A method of producing a magnetic recording medium according to claim 14, wherein nitrogen is introduced in said carbonaceous protective layer under the conditions that a nitrogen concentration is gradually increased from a bottom surface side to a top surface side in said carbonaceous protective layer.

16. A method of producing a magnetic recording medium according to claim 14, wherein nitrogen is introduced in said carbonaceous protective layer under the conditions that nitrogen is substantially not contained in a lower half portion, occupying

substantially one half of the thickness-wise distance from a bottom surface of said carbonaceous protective layer.

17. A method of producing a magnetic recording medium according to any one of claims 14 to 16, wherein said carbonaceous protective layer is deposited under irradiation of a nitrogen ion beam, or under the application of a nitrogen atmosphere or by combining them together, thereby introducing nitrogen into said carbonaceous protective layer.

*SMP* 18. A magnetic disk apparatus comprising a recording head for recording information and a reproducing head for reproducing information to and from a magnetic recording medium, in which said magnetic recording medium comprises a non-magnetic substrate having applied thereof a magnetic recording layer, and said magnetic recording layer has a carbonaceous protective layer, formed thereon by a Filtered Cathodic Arc process, which contains nitrogen distributed therein.

19. A magnetic disk apparatus according to claim 18, wherein nitrogen is distributed in an inclined concentration in said carbonaceous protective layer, and a nitrogen concentration is gradually increased from a bottom surface side to a top surface side in said carbonaceous protective layer.

*SMP* 20. A magnetic disk apparatus according to claim 18, wherein nitrogen is substantially not contained in a lower half portion, occupying a substantially one half of the thickness-wise distance from a bottom surface of said carbonaceous protective layer.